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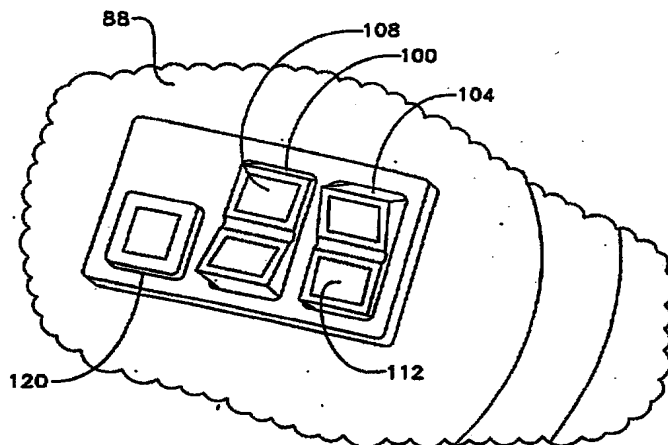
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(54) Abstract Title

**Auto-up switch for stabiliser legs**

(57) Automatic and simultaneous retraction of a pair of stabilizer legs (24,28, Fig 1) for a backhoe loader machine (10) is beneficial for the operator when operation of the backhoe loader (10) is complete. Instead of retracting the stabilizer legs (24,28) by manually holding a pair of control switches (100, 104) continuously in a control position, the operator may simply push an auto-up switch (120) with a single, "one-touch" contact. Once the auto-up switch (120) has been activated, a timer relay (310, Fig 5) is enabled. The timer relay acts independently of the auto-up switch (120) to control the simultaneous retraction of the stabilizer legs without any further contact to the auto-up switch. When the timer relay (310) is enabled, it sends a signal to activate the control switches for a preselected time. The activation of the control switches actuates a pair of solenoid valves (190,194, Fig 4) which control the movement of the stabilizer legs (24,28) from any one of a plurality of extended positions to a fully retracted position within the preselected time.

**Fig. 3**



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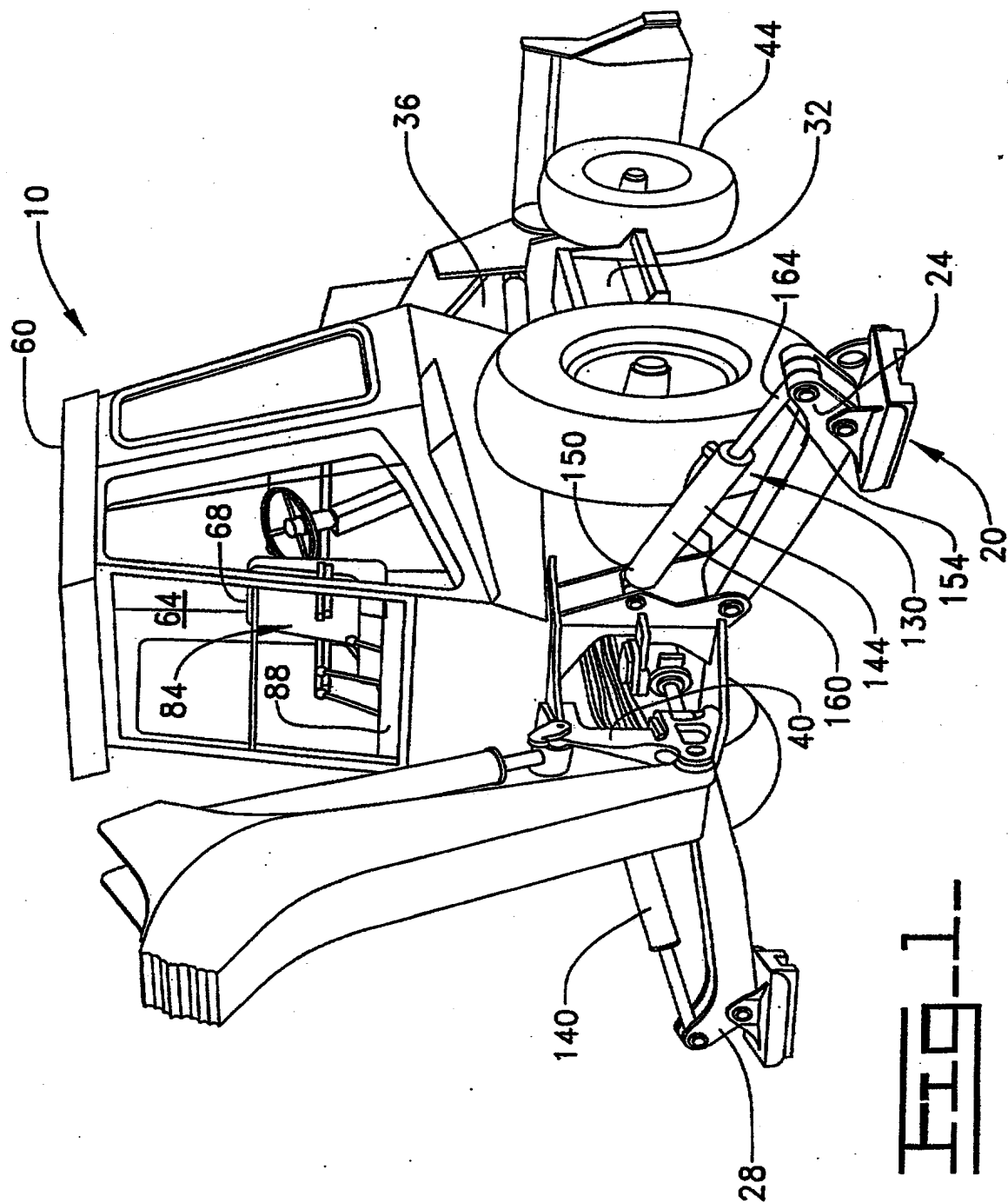


FIG. 1

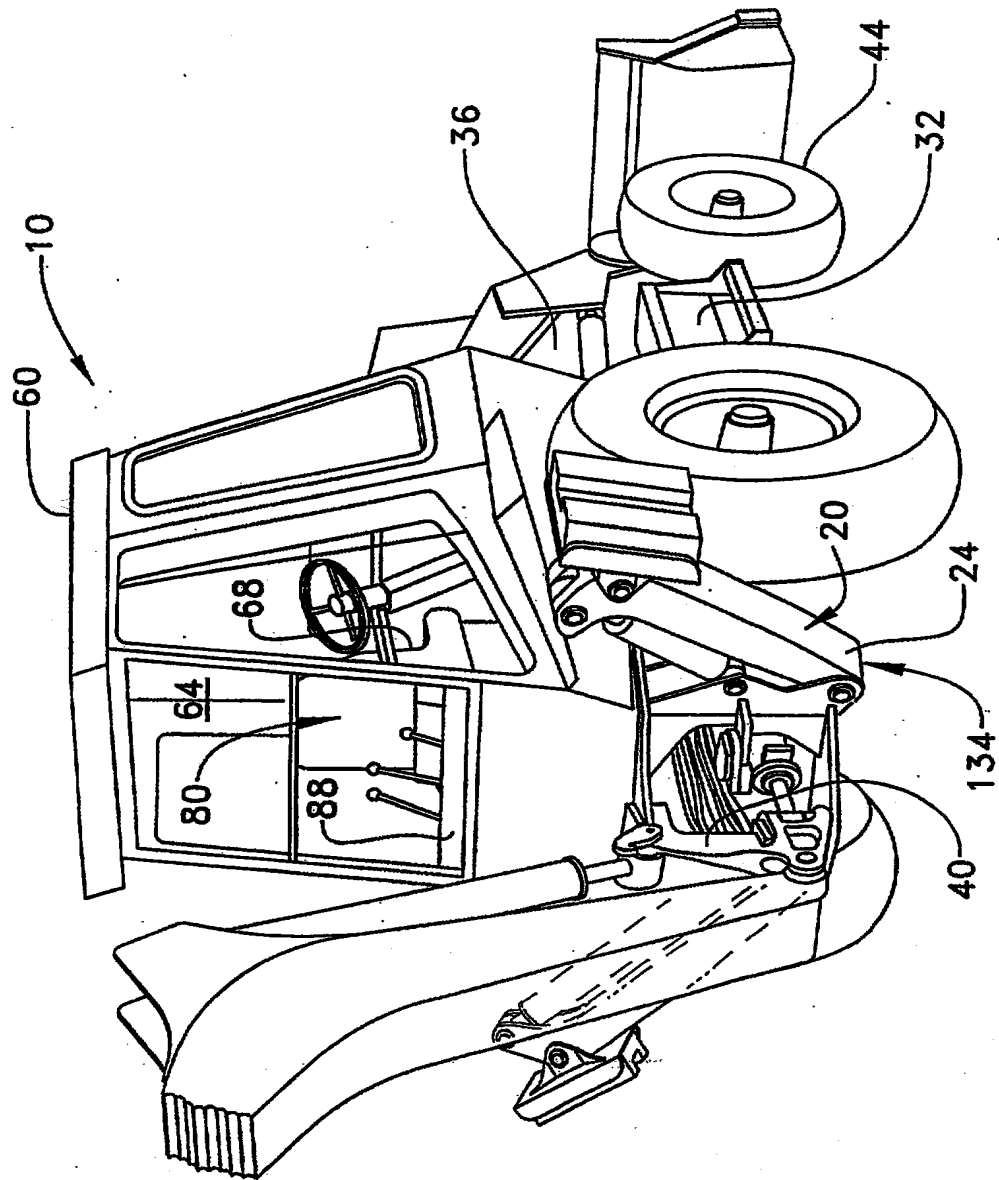
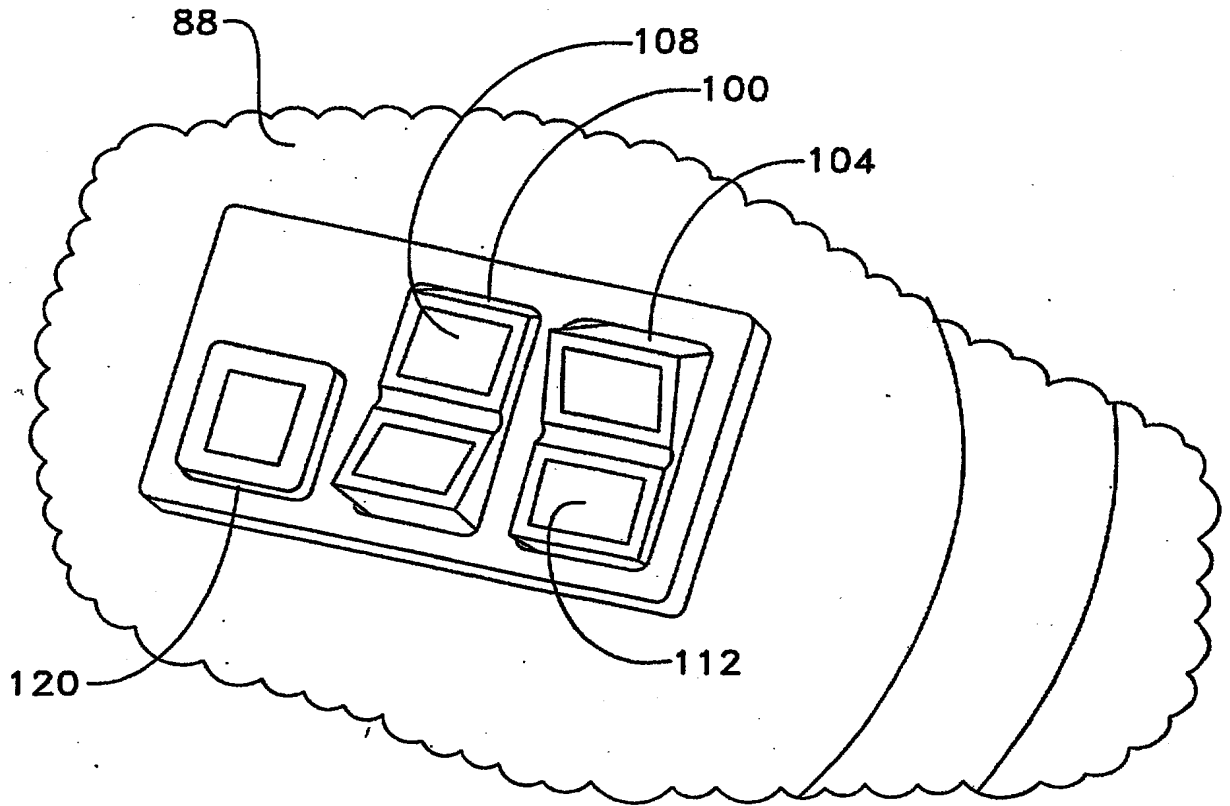
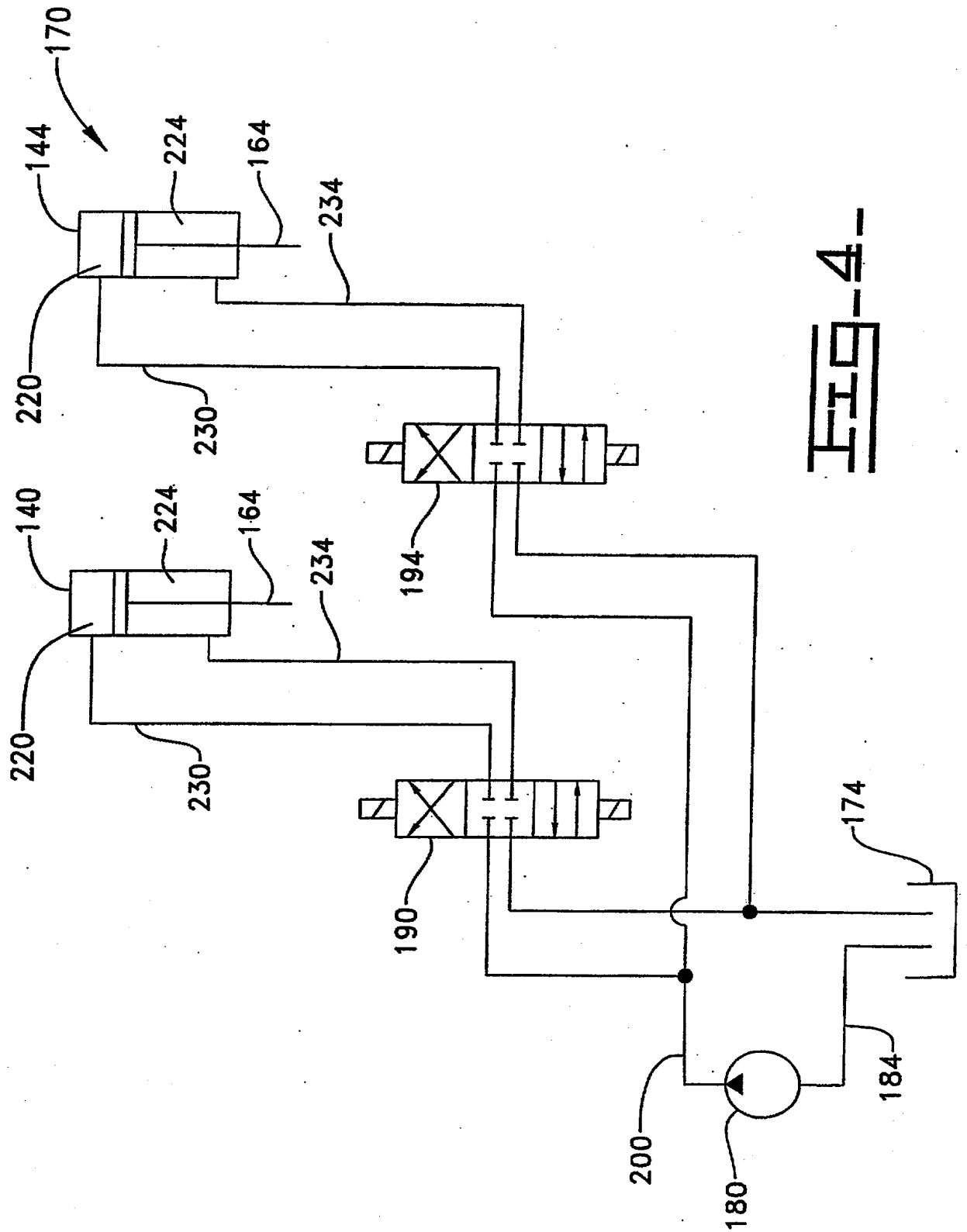


Fig-3-





**FIG. 4--**

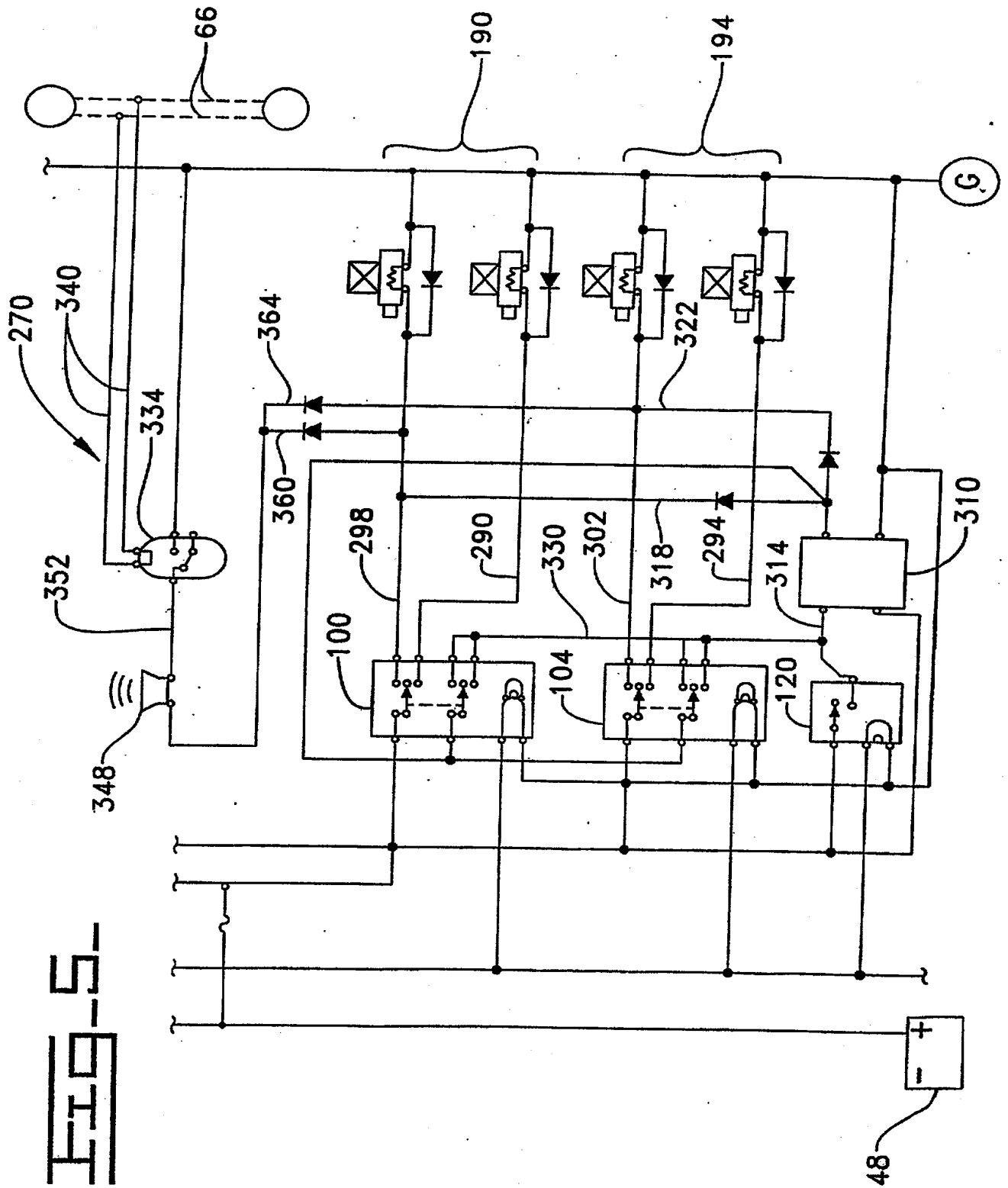


FIG-5-

1     AN AUTO-UP SWITCH FOR SIMULTANEOUSLY RETRACTING A  
2     PAIR OF STABILIZER LEGS ON A BACKHOE LOADER MACHINE  
3

4  
5     Technical Field

6             This invention relates generally to a  
7     mechanism for retracting a pair of stabilizer legs  
8     for a backhoe loader machine and more particularly to  
9     the ability to simultaneously retract the pair of  
10    stabilizer legs with a single switch from an extended  
11    position to a fully retracted position.  
12

13    Background Art

14            It is well known that a machine, such as a  
15    backhoe loader, is used to dig ditches, foundations,  
16    basements, and the like. During such machining  
17    operations, the backhoe loader machine utilizes a  
18    pair of stabilizer legs to maintain a steady and  
19    solid working foundation. The foundation is  
20    established when the pair of stabilizer legs are  
21    extended either individually or together by separate  
22    and continuous activation of a pair of control  
23    switches. Each one of the pair of control switches  
24    is coupled with a respective one of the pair of  
25    stabilizer legs and the amount of stabilizer leg  
26    extension depends on the surrounding terrain.  
27    Generally, upon completion of machining operations,  
28    the pair of stabilizer legs are retracted through the  
29    separate and continuous activation of the pair of  
30    control switches. The ability to retract both of the

1 stabilizer legs simultaneously without continuous  
2 operation of the pair of control switches, however,  
3 would be beneficial for an operator due to an ease in  
4 operation.

5 A design disclosed in U.S. Pat.  
6 No.4,124,226 issued to Frank T. Phillips on 07  
7 November 1978 utilizes four hydraulically operated  
8 outrigger assemblies on a mobile crane. A control  
9 system is provided for operating the eight cylinders  
10 to extend, retract, and lower and raise the  
11 outriggers through actuation of horizontal and  
12 vertical stabilizer cylinders, respectively.  
13 Simultaneous extension or retraction of the outrigger  
14 assemblies is achieved by the continuous operation of  
15 various switches in combination. Unfortunately, the  
16 ability to simultaneously retract the outrigger  
17 assemblies through a single switch that does not  
18 require continuous operation is not disclosed. The  
19 ability to simultaneously retract the outrigger  
20 assemblies in such a manner would improve operator  
21 flexibility by lessening the time and energy normally  
22 spent on retracting the outrigger assemblies.

23 The present invention is directed to  
24 overcoming the problems as set forth above.

25  
26 Disclosure of the Invention  
27

28 In one aspect of the present invention, a method  
29 is disclosed for individually extending and  
30 simultaneously retracting a pair of stabilizer legs  
31 for a work machine. The work machine has a control

1 device for selecting forward or reverse directions of  
2 movement for the work machine and is operatively  
3 associated with a power source. The method comprises  
4 the steps of activating a pair of control switches in  
5 communication with the power source. One of the pair  
6 of control switches is operatively associated with a  
7 respective one of a pair of stabilizer legs for  
8 individually moving the stabilizer legs from a  
9 retracted position to an extended position. Then,  
10 activating a singular auto-up switch in communication  
11 with the power source. The auto-up switch is  
12 operatively associated with the pair of stabilizer  
13 legs for moving both of the pair of stabilizer legs  
14 simultaneously from the extended position to the  
15 retracted position.

16 In another aspect of the invention, a work  
17 machine has front and rear end portions, a control  
18 panel disposed within an interior of the work  
19 machine, a pair of stabilizer legs connected to the  
20 rear end portion, a hydraulic cylinder operatively  
21 associated with each of the pair of stabilizer legs  
22 for moving the stabilizer legs in a plurality of  
23 positions between fully extended and fully retracted.  
24 The work machine is capable of movement in forward or  
25 reverse directions and has a control device for  
26 selecting the forward or reverse direction. The  
27 invention comprises  
28 a pair of control switches located on the control  
29 panel that are operatively associated with a  
30 respective one of the pair of stabilizer legs. The  
31 pair of control switches are adapted through

1 activation for actuating the hydraulic cylinders  
2 individually to move the stabilizer legs from any one  
3 of the plurality of retracted positions to any one of  
4 the plurality of extended positions. A singular  
5 auto-up switch is located on the control panel and is  
6 operatively associated with the pair of stabilizer  
7 legs. The auto-up switch is adapted through  
8 activation for actuating the pair of hydraulic  
9 cylinders simultaneously to move both of the pair of  
10 stabilizer legs from the any one of the plurality of  
11 extended positions to the fully retracted position.

12 The present invention includes the ability  
13 to simultaneously retract a pair of stabilizer legs  
14 for a work machine through a single, auto-up switch.  
15 The simultaneous and automatic retraction of the pair  
16 of stabilizer legs increases ease of operation and  
17 operator flexibility.

#### 18 19 Brief Description of the Drawings

20 Fig. 1 is a side elevational view of a  
21 backhoe loader machine having an extension and  
22 retraction system for a pair of stabilizer legs in  
23 accordance with the present invention and depicting  
24 the stabilizer legs in an extended position;

25 Fig. 2 is a side elevational view of the  
26 backhoe loader machine of Fig. 1 depicting the  
27 stabilizer legs in a fully retracted position;

28 Fig. 3 is an enlarged perspective view of a  
29 portion of a control panel within the interior of a  
30 cab for the backhoe loader machine of Fig. 1;

1           Fig. 4 is an enlarged hydraulic schematic  
2 showing the hydraulic operation of the extension and  
3 retraction system in detail and in accordance with  
4 the present invention; and

5           Fig. 5 is a schematic diagram of the  
6 electrohydraulic extension and retraction system for  
7 the backhoe loader machine of Fig. 1 in accordance  
8 with the present invention.

9  
10       Best Mode for Carrying Out the Invention

11           While the invention is susceptible to  
12 various modifications and alternative forms, a  
13 specific embodiment thereof has been shown by way of  
14 example in the drawings and will herein be described  
15 in detail. It should be understood, however, that  
16 there is no intent to limit the invention to the  
17 particular form disclosed, but on the contrary, the  
18 intention is to cover all modifications, equivalents,  
19 and alternatives falling within the spirit and scope  
20 of the invention as defined by the appended claims.

21           Referring to Figs. 1-5, a work machine 10,  
22 such as a backhoe loader, is shown incorporating an  
23 extension and retraction system 20 for a pair of  
24 stabilizer legs 24,28. Although the present  
25 invention is shown in operative association with a  
26 backhoe loader, it should be understood that the  
27 present invention may be incorporated on any suitable  
28 work machine 10. Looking more closely at Figs. 1-2,  
29 the backhoe loader 10 includes a machine frame 32  
30 with front and rear end portions 36,40 supported for  
31 travel by a plurality of wheels, one of which is

1 shown at 44. An electrical power source 48, such as a  
2 battery, is disposed within the frame 32 of the  
3 backhoe loader 10 and is shown schematically on Fig.  
4 5. A cab 60 is mounted on the frame 32 in a well-  
5 known manner and has an interior portion 64. A  
6 control device 66, shown schematically in Fig. 5, is  
7 disposed within the interior portion 64 to allow the  
8 operator (not shown) to select either forward or  
9 reverse directions of movement for the backhoe loader  
10 10. It should be understood that the control device  
11 66 may be of any suitable design for actuating either  
12 a standard or automatic transmission of the backhoe  
13 loader 10. The interior portion 64 includes a seat  
14 68 therein for occupation by the operator (not  
15 shown). The seat 68 swivels between front and rear  
16 positions 80,84, the rear position 84 being shown in  
17 Fig. 1. When the seat 68 is in the rear position 84,  
18 it faces a rear control panel 88, a portion of which  
19 is shown in Fig. 3. The rear control panel 88 is  
20 connected in a well-known manner within the interior  
21 portion 64 of the cab 60. As seen in Fig. 3, a pair  
22 of control switches 100,104 of any suitable type,  
23 such as spring-loaded toggle switches, capable of  
24 movement to upper and lower control positions 108,112  
25 are mounted on the rear control panel 88. A single,  
26 auto-up switch 120 of any suitable type, such as a  
27 push button spring-loaded switch, is mounted adjacent  
28 one of the pair of control switches 100. It should  
29 be understood that the control switches 100,104 and  
30 the auto-up switch 120 may be mounted on any suitable  
31 structure within the interior portion 64 of the cab

1 60. It should also be understood that the control  
2 switches 100,104 or the auto-up switch 120 may be  
3 incorporated together or separately to achieve the  
4 same function. The control switches 100,104 and  
5 auto-up switch 120 are connected for activation to  
6 the electrical power source 48 in a well-known  
7 manner.

8 Referring again to Figs. 1-2, the pair of  
9 stabilizer legs 24,28 are secured on the rear end  
10 portion 40 of the frame 32 in a conventional manner.  
11 The stabilizer legs 24,28 are movable between a fully  
12 extended position 130 and a fully retracted position  
13 134 (the fully retracted position 134 being shown in  
14 Fig. 2). It should be understood that the stabilizer  
15 legs 24,28 may be positioned at any one of a  
16 plurality of positions along the fully extended and  
17 fully retracted positions 130,134. The movement of  
18 the stabilizer legs 24,28 is accomplished through a  
19 pair of hydraulic cylinders 140,144. Each of the  
20 pair of hydraulic cylinders 140,144 are connected in  
21 a well-known manner at a first end 150 to the frame  
22 32 and at a second end 154 to a respective one of the  
23 pair of stabilizer legs 24,28. The hydraulic  
24 cylinders 140,144 may be of any suitable type, but  
25 preferably double actuated. The double actuated  
26 hydraulic cylinders 140,144 each include a housing  
27 160 with a piston and rod assembly 164 therein, seen  
28 more clearly in Fig. 1 and also diagrammatically in  
29 hydraulic circuit 170 of Fig. 4.

30 The hydraulic circuit 170 of Fig. 4  
31 includes a reservoir 174 for holding a quantity of

1     hydraulic fluid. The reservoir 174 is connected to a  
2     pump 180 via line 184. The pump 180 may be of any  
3     suitable type capable of pressurizing the hydraulic  
4     fluid. The pump 180 is connected to a pair of  
5     solenoid valves 190,194 via line 200. The solenoid  
6     valves 190,194 may be of any suitable type but  
7     capable of actuation from a normally closed position  
8     (not shown) to either a first or second open position  
9     (not shown). Each of the solenoid valves 190,194  
10    includes a control valve (not shown) therein and is  
11    connected to a respective one of the pair of  
12    hydraulic cylinders 140,144. The piston and rod  
13    assembly 164, normally disposed at a mid-position, is  
14    capable of moving the stabilizer legs 24,28 between  
15    the extended and retracted positions 130,134  
16    dependent upon the introduction of pressurized  
17    hydraulic fluid into either upper or lower portions  
18    220,224 of the hydraulic cylinders 140,144 through  
19    lines 230,234, respectively, in response to movement  
20    of the control valves (not shown) to either of the  
21    first or second open positions (not shown) in a well-  
22    known manner. It should be understood that although  
23    the solenoid valves 190,194 shown have two open  
24    positions respectively connected to the upper and  
25    lower portions 220,224 of the hydraulic cylinders  
26    140,144 to facilitate the extension and retraction of  
27    the stabilizer legs 24,28, two separate solenoid  
28    valves could be utilized to achieve the same  
29    function.                   Referring more particularly to an  
30    electrical circuit 270 for the extension and  
31    retraction system 20, shown in Fig. 5, the pair of

1 control switches 100,104 and auto-up switch 120 are  
2 shown schematically in communication with the  
3 electrical power source 48. Each of the control  
4 switches 100,104 are coupled to a respective solenoid  
5 valve 190,194 via extension and retraction lines  
6 290,294,298,302, respectively. It should be  
7 understood that four solenoid valves are shown in  
8 Fig. 5 to clarify the separate extension and  
9 retraction circuits of each of the stabilizer legs  
10 24,28. A timer relay 310 is shown coupled via input  
11 line 314 to the auto-up switch 120 and coupled via  
12 output lines 318,322 to each of the control switches  
13 100,104, respectively. Further, the control switches  
14 100,104 are coupled to the timer relay 310 through  
15 input line 330 which is operative with input line 314  
16 from the auto-up switch 120. The control device 66  
17 is connected to an alarm relay 334 through output  
18 lines 340. The alarm relay 334 is coupled to an  
19 alarm device 348 via line 352. The pair of control  
20 switches 100,104 are coupled to the alarm device 348  
21 via output lines 360,364, respectively. It should be  
22 understood that the electrical circuit 270 is  
23 connected in a conventional manner to a ground G.  
24 Further, lighting for the rear control panel 88 is  
25 shown schematically in Fig. 5 but not described in  
26 detail. It should also be understood that although a  
27 timer relay 310 is described, any suitable time delay  
28 mechanism, such a pressure or limit switch (not  
29 shown), may be utilized without extending beyond the  
30 scope of the present invention.

1     Industrial Applicability

2             Prior to operation of the backhoe loader 10  
3     for digging, trenching, and the like, the operator  
4     (not shown) will generally stabilize the backhoe  
5     loader 10 by extending the stabilizer legs 24,28 into  
6     contact with the surrounding terrain. To accomplish  
7     that purpose, the operator (not shown) will manually  
8     hold the control switches 100,104, either singularly  
9     or together, in the lower control position 112 until  
10    the desired extension is obtained. The movement of  
11    the control switches 100,104 to the lower control  
12    position 112 activates the control switches 100,104  
13    to actuate the solenoid valves 190,194 to the first  
14    open position in a conventional manner. The first  
15    open position of the solenoid valves 190,194 allows  
16    hydraulic fluid from the reservoir 174 to move  
17    through the pump 180. The pump 180 pressurizes the  
18    hydraulic fluid for entry through the solenoid valves  
19    190,194 and into the upper portion 220 of the  
20    hydraulic cylinders 140,144, thus extending the  
21    stabilizer legs 24,28. The retraction of the  
22    stabilizer legs 24,28 may also be accomplished  
23    through the control switches 100,104. To accomplish  
24    that purpose, the operator (not shown) will manually  
25    hold the control switches 100,104, either singularly  
26    or together, in the upper control position 108 until  
27    the desired retraction is obtained. As described  
28    previously, the movement of the control switches  
29    100,104 to the upper control position 108 activates  
30    the control switches 100,104 to actuate the solenoid  
31    valves 190,194 to the second open position.

1     Conversely, pressurized hydraulic fluid flows through  
2     the solenoid valves 190,194 and into the lower  
3     portion 224 of the hydraulic cylinders 140,144 for  
4     retracting the stabilizer legs 24,28.

5             Automatic and simultaneous retraction of  
6     the stabilizer legs 24,28 is beneficial for the  
7     operator (not shown) when operation of the backhoe  
8     loader 10 is complete. Instead of retracting the  
9     stabilizer legs 24,28 manually by holding the control  
10    switches 100,104 in the upper control position 108,  
11    the operator (not shown) may simply push the auto-up  
12    switch 120 with a single, "one-touch" contact to  
13    initialize activation. The "one-touch" contact of the  
14    auto-up switch 120 removes the requirement of  
15    manually holding a switch continuously throughout the  
16    retraction of the stabilizer legs 24,28. Once the  
17    auto-up switch 120 has been activated, the timer  
18    relay 310 is enabled. Thereafter, the timer relay  
19    310 acts independently of the auto-up switch 120 to  
20    control the simultaneous retraction of the stabilizer  
21    legs 24,28 without any further contact to the auto-up  
22    switch 120. This is accomplished when the timer  
23    relay 310 is enabled by a primary signal from the  
24    auto-up switch 120. The timer relay 310 then sends a  
25    signal to activate the control switches 100,104 for a  
26    preselected time, preferably greater than the total  
27    time necessary to fully retract the stabilizer legs  
28    24,28 from the fully extended position 130. The  
29    activation of the control switches 100,104 actuates  
30    the solenoid valves 190,194 into the second open  
31    position, allowing pressurized hydraulic fluid to

1 flow simultaneously into the lower portions 224 of  
2 the hydraulic cylinders 140,144. The stabilizer legs  
3 24,28 are moved completely to the fully retracted  
4 position 134 from any one of the plurality of  
5 extended positions within the preselected time.  
6 However, if either the control switches 100,104 or  
7 auto-up switch 120 is contacted by the operator (not  
8 shown) during the preselected time, the simultaneous  
9 retraction of the stabilizer legs 24,28 is  
10 interrupted. This occurs due to a secondary signal  
11 being sent from the control switches 100,104 or auto-  
12 up switch 120 during the preselected time that  
13 disables the timer relay 310. Further, if the  
14 operator (not shown) moves the control device 66 into  
15 gear during the preselected time, thus selecting the  
16 forward or reverse direction of movement for the  
17 backhoe loader 10, the alarm device 348 will sound.  
18 This occurs when the alarm device 348 is activated by  
19 a signal from both the control device 66, when  
20 selecting the forward or reverse direction of  
21 movement of the backhoe loader 10, and the timer  
22 relay 310, when enabled to control the simultaneous  
23 retraction of the stabilizer legs 24,28. It should  
24 be understood that the movement of the control device  
25 66 into gear during retraction of the stabilizer legs  
26 24,28, either by use of the control switches 100,104  
27 or the auto-up switch 120, will cause activation of  
28 the alarm device 348.

29 Other aspects, objects and advantages of  
30 this invention can be obtained from a study of the  
31 drawings, disclosure and the appended claims.

Claims

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1. The method of individually extending and simultaneously retracting a pair of stabilizer legs for a work machine, the work machine having a control device for selecting forward or reverse directions of movement for the work machine and being operatively associated with a power source, comprising the steps of:

activating a pair of control switches in communication with the power source, one of the pair of control switches being operatively associated with a respective one of a pair of stabilizer legs for individually moving the stabilizer legs from a retracted position to an extended position; and

activating a singular auto-up switch in communication with the power source, the auto-up switch being operatively associated with the pair of stabilizer legs for moving both of the pair of stabilizer legs simultaneously from the extended position to the retracted position.

2. The method of individually extending and simultaneously retracting the pair of stabilizer legs as claimed in claim 1, wherein the step of activating the auto-up switch includes the step of:

contacting the auto-up switch in a single, non-continuous motion, the movement of both of the pair of stabilizer legs simultaneously from the extended position to the retracted position being

1 independent of further contact with the auto-up  
2 switch after activation.

3  
4 3. The method of individually extending  
5 and simultaneously retracting the pair of stabilizer  
6 legs as claimed in Claim 1, including the step of:

7 activating the auto-up switch through a  
8 single, non-continuous contact that automatically  
9 moves both of the pair of stabilizer legs  
10 simultaneously from the extended position to the  
11 retracted position, the movement of both of the pair  
12 of stabilizer legs being independent of the auto-up  
13 switch after the contact.

14  
15 4. The method of individually extending  
16 and simultaneously retracting the pair of stabilizer  
17 legs as claimed in claim 2 or claim 3, including the  
18 step of:

19 coupling a time delay mechanism with the  
20 auto-up switch so that the simultaneous retraction of  
21 the pair of stabilizer legs is completed within a  
22 preselected time.

23  
24 5. The method of individually extending  
25 and simultaneously retracting the pair of stabilizer  
26 legs as claimed in claim 4, wherein:

27 activating either of the pair of control  
28 switches or the auto-up switch during the preselected  
29 time disables the time delay mechanism and interrupts  
30 the simultaneous retraction of the pair of stabilizer  
31 legs.

1  
2           6.    The method of individually extending  
3   and simultaneously retracting the pair of stabilizer  
4   legs as claimed in claim 4 or claim 5, wherein:

5           selecting the forward or reverse direction  
6   of the work machine with the control device prior to  
7   the completion of the preselected time for  
8   simultaneously retracting the pair of stabilizer legs  
9   activates an alarm device coupled with the control  
10   device and time delay mechanism.

11  
12           7.    The method of individually extending  
13   and simultaneously retracting the pair of stabilizer  
14   legs as claimed in any preceding Claim, wherein  
15   moving the stabilizer legs from the retracted  
16   position to the extended position includes the steps  
17   of:

18           actuating a pair of solenoid valves, one of  
19   the pair of solenoid valves being connected with a  
20   respective one of the pair of control switches and  
21   movable from a closed position to an open position by  
22   the activation of the control switches; and

23           allowing a flow of pressurized hydraulic  
24   fluid to move from a pump to a first end of a pair of  
25   hydraulic cylinders through the actuation of the pair  
26   of solenoid valves to the open position, one of the  
27   hydraulic cylinders operative with a respective one  
28   of the pair of stabilizer legs to move the stabilizer  
29   legs from a retracted position to an extended  
30   position.

31

1           8. The method of individually extending  
2 and simultaneously retracting the pair of stabilizer  
3 legs as claimed in claim 7, wherein moving the  
4 stabilizer legs from the extended position to the  
5 retracted position includes the steps of:

6           actuating the pair of solenoid valves, the  
7 pair of solenoid valves being connected with the  
8 auto-up switch and movable from the closed position  
9 to the open position by the activation of the auto-up  
10 switch; and

11           allowing the pressurized hydraulic fluid to  
12 move from the pump to a second end of the pair of  
13 hydraulic cylinders through the actuation of the pair  
14 of solenoid valves to the open position to move the  
15 stabilizer legs from an extended position to a  
16 retracted position.

17  
18           9. A work machine having front and rear  
19 end portions, a control panel disposed within an  
20 interior of the work machine, a pair of stabilizer  
21 legs connected to the rear end portion, a hydraulic  
22 cylinder operatively associated with each of the pair  
23 of stabilizer legs for moving the stabilizer legs in  
24 a plurality of positions between fully extended and  
25 fully retracted, the work machine capable of movement  
26 in forward or reverse directions and having a control  
27 device for selecting the forward or reverse direction  
28 thereof, comprising:

29           a pair of control switches located on the  
30 control panel and being operatively associated with a  
31 respective one of the pair of stabilizer legs and

1 adapted through activation for actuating the  
2 hydraulic cylinders individually to move the  
3 stabilizer legs from any one of the plurality of  
4 retracted positions to any one of the plurality of  
5 extended positions; and

6 a singular auto-up switch located on the  
7 control panel and being operatively associated with  
8 the pair of stabilizer legs and adapted through  
9 activation for actuating the pair of hydraulic  
10 cylinders simultaneously to move both of the pair of  
11 stabilizer legs from the any one of the plurality of  
12 extended positions to the fully retracted position.  
13

14 10. The work machine as claimed in claim  
15 9, wherein the auto-up switch actuates the pair of  
16 hydraulic cylinders automatically when activated by a  
17 single, non-continuous contact, the movement of both  
18 of the pair of stabilizer legs being independent of  
19 further contact with the auto-up switch after  
20 activation.  
21

22 11. The work machine as claimed in claim  
23 10, including a time delay mechanism in communication  
24 with the auto-up switch, the time delay mechanism  
25 being responsive to the auto-up switch for  
26 controlling the completion of the simultaneous  
27 retraction of the pair of stabilizer legs within a  
28 preselected time.  
29

30 12. The work machine as claimed in claim  
31 11, wherein during the preselected time and in

1 response to either of the pair of control switches or  
2 the auto-up switch the time delay mechanism  
3 interrupts the simultaneous retraction of the pair of  
4 stabilizer legs.

5

6 13. The work machine as claimed in any one  
7 of claims 9 to 12, wherein the auto-up switch is  
8 located separately from the pair of control switches.

9

10 14. The work machine as claimed in any one  
11 of claims 9 to 12, wherein the auto-up switch is  
12 integral with the pair of control switches.

13

14 15. The work machine as claimed in any one  
15 of claims 9 to 14, wherein actuation of the hydraulic  
16 cylinders for individually moving the stabilizer legs  
17 from the any one of the plurality of retracted  
18 positions to the any one of a plurality of extended  
19 positions is controlled through a hydraulic circuit  
20 including a pair of solenoid valves movable between  
21 open and closed positions and a pump in fluid  
22 communication with the pair of solenoid valves, each  
23 of the solenoid valves being connected to a  
24 respective one of the pair of control switches and  
25 adapted for actuation to the open position when  
26 either of the pair of control switches is activated.

27

28 16. The work machine as claimed in any of  
29 claims 9 to 15, wherein the actuation of the  
30 hydraulic cylinders for simultaneously moving the  
31 stabilizer legs from the any one of the plurality of

1 extended positions to the fully retracted position is  
2 controlled through a hydraulic circuit including a  
3 pair of solenoid valves movable between open and  
4 closed positions and a pump in fluid communication  
5 with the pair of solenoid valves, both of the  
6 solenoid valves being connected to the auto-up switch  
7 and adapted for actuation to the open position when  
8 the auto-up switch is activated.

9  
10 17. The work machine as claimed in claim  
11 16 when dependent on claim 11 or claim 12, wherein  
12 both of the solenoid valves are further connected to  
13 the time delay mechanism.

14  
15 18. A method of individually extending and  
16 simultaneously retracting a pair of stabilizer legs  
17 for a work machine, substantially as hereinbefore  
18 described with reference to the accompanying  
19 drawings.

20  
21 19. A work machine substantially as  
22 hereinbefore described with reference to the  
23 accompanying drawings.

24



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Application No: GB 0011756.4  
Claims searched: 1-19

Examiner: Dave McMunn  
Date of search: 19 October 2000

## Patents Act 1977 Search Report under Section 17

### Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.R): B8H (HAC, HFC).

Int Cl (Ed.7): E02F 9/08.

Other: ONLINE : WPI, EPODOC, JAPIO.

### Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
A	EP 0,741,209 A2 (CLARK). See Figs 3 & 4 & note lines 18-24 column 6	1, 9
A	EP 0,285,281 A1 (CASE). Note stabiliser safety arrangement	1, 9
A	US 4,515,520 (CASE). Note stabiliser control circuits shown in Fig 7 onwards	1, 9

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	B	Patent document published on or after, but with priority date earlier than, the filing date of this application.